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TITLE: PROTECTIVE CIRCUIT FOR A SUPERSONIC HUMIDIFIER

BACKGROUND OF THE INVENTION

This invention relates to a protective circuit for a supersonic humidifier, particularly to one utilizing a compare circuit to obtain working voltage at two terminals of an ~~oscillator~~ ultrasonic vibrating member for deciding to turn off or continue to let a switch on so that the humidifier may be timely stopped in case of no water left in a water tank, without possibility of burning up.

Nowadays, conventional supersonic humidifiers all use a detective element in a water tank to detect if there is water in the water tank or not so that ~~a supersonic oscillator~~ an ultrasonic vibrating member should continue to operate or not with the power switch being on. In this way the humidifier may operate normally, protected from burning up in case of no water in the water tank.

However, the detective element such as a vibrating needle, a magnetic switch, a HALL IC in cooperation of a float occupies large dimensions, hardly applicable to a comparatively small humidifier. Besides, in case that water in the water tank is used up, or the float is placed upside down, the detecting element may detect erroneously to let the humidifier continue to operate, resulting in burning up.

SUMMARY OF THE INVENTION

This invention has been devised to offer a protective circuit for a supersonic humidifier, which can produce compared signals for deciding whether the humidifier should continue to operate or to stop.

The feature of the invention is a drive circuit containing a compare circuit to obtain working current, working voltage ~~and oscillating frequency (working value)~~ at two terminals of an ~~oscillator~~ ultrasonic vibrating member to decide to continue or stop operation of the humidifier so as to

protect it from burning up.

BRIEF DESCRIPTION OF A DRAWING

This invention will be better understood by referring to the accompanying drawing, wherein:

Figure 1 is a diagram of a protective circuit for a supersonic humidifier in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of a protective circuit for a supersonic humidifier in the present invention, as shown in Fig. 1, includes an input terminal of DCV power source, a voltage stabilizing circuit A connected to the input terminal, a drive circuit B having a terminal P2 of an inductance L1, an ~~oscillator~~ ultrasonic vibrating member Y1, a capacitor C3 and a resistor R6, and continually connected to the voltage stabilizing circuit A, an indicator L1, an ~~oscillator~~ ultrasonic vibrating member Y1, a capacitor C3, and a resistor R6. Then input signal is fed at the terminal P2 to a voltage dividing circuit composed of a resistor 13, a diode D3 and a capacitor C5, and then to a compare circuit C composed of resistor R12, and a minus input terminal or a second pin of an OP amplifier U2A, functioning as a signal input. Another terminal P1 of the ultrasonic vibrating member Y1 ~~is also contained in the compare circuit C,~~ is connected to one terminal of a resistor R9, supplying a signal input (or input voltage), which is divided by the resister R9 and the R10, and the terminal P11 may produce a divided voltage to be sent as an input to the third pin of the OP amplifier U2A, that is, the signal input coming from P2 is sent to the second pin 2 of the OP amplifier U2A, and the signal input coming from the terminal P1 is sent to a third pin 3 of the OP amplifier U2A. As the input at the P1 is sent to the compare circuit, the voltage sent from the P1 to the P11 of the compare circuit (C) is stable and constant because the voltage at the P1 is equal to that at the input

terminal of the DCV source. For example, if the voltage at the input terminal of the DCV source is 24v, that at the P1 is also 24v. If the value of the resistor R9 and R10 of the compare circuit C are the same, the voltage at the P11 is 11v, after divided. So the input voltage at the third pin of the OP amplifier U2A is also 11v. Nevertheless, P2 is affected by the signal alteration by the water level in the water tank of the humidifier by detection of the ultrasonic vibrating member Y1, the voltage (signal) at the P2 sent to the P12 may alter depending on the water quantity in the store tank of the ultrasonic vibrating member Y1.

In operation of the protective circuits, the ~~oscillator~~ ultrasonic vibrating member Y1 operates normally in case the water level in the water tank of the humidifier is normal, so the working current, the working voltage ~~and the oscillating frequency~~ received by the terminal P2 is normal. In other words, the two values of the signal sources at the terminals p1 and P2 transmitted to the second and the third pin of the OP amplifier U2A are substantially stable, so the signal sent from the first pin 1 of the OP amplifier U2A to an integrated circuit IC1 is relatively stable. Then input voltage sent to the third pin 3 of the U2A, ~~no signal is sent out from the fitst pin of the OP amplifier U2A to an integrated circuit ICI.~~ is larger than that sent to the second pin 2, keeping the U2A ON. Then output voltage from the output pin 1 of the U2A is equal to that at the P11 to let the ICI operate normal. Therefore, transistors Q1 and Q2 in the driving circuit B of the ultrasonic vibrating member Y1 is normally ON, with the ultrasonic vibrating member Y1 kept stable under operation. But provided that the water in the water tank is used up and dry, the working current, the working voltage ~~and the oscillating frequency~~ of the ~~oscillator~~ ultrasonic vibrating member Y1 may change (given each value changing larger or smaller than the normal value, resting on the material and manufacturing methods of

makers of ultrasonic vibrating members.) In this invention, the working current, the working voltage and the supersonic frequency are enhanced, as the ultrasonic vibrating member produces high temperature, the working current ~~and the oscillating frequency are~~ is also upgraded, with the working voltage elevated at the same time and with the voltage at the P2 increased accordingly. ~~Then signal sources of the terminals P2 and P1 may become unequal or excessive large, and the second pin 2 and the third pin 3 may have different output values, permitting the first pin 1 of the OP amplifier U2A may transmit a signal output to the IC1 to activate the drive circuit B of the oscillator Y1, thn the voltage sent from the P2 to the P12 is larger than that at the~~ P11, so the input voltage of at the second pin 2 of the OP amplifier U2A is higher than that at the third pin 3, forcing the first pin 1 of the OP amplifier U2A not to transmit a signal output to the IC1, turning the OP amplifier U2A OFF, and subsequently the transistors Q1 and Q2 also turned Off, stopping ~~both a fan and~~ the ~~oscillator~~ ultrasonic vibrating member Y1 so as to protect the humidifier.

While the preferred embodiment of the protective circuit for a supersonic humidifier has been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications that may fall within the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A protective circuit for a supersonic humidifier comprising:

An input terminal of DC source:

A voltage stabilizer connected to said input terminal of DC source:

A drive circuit of an oscillator connected behind said voltage stabilizer and having a terminal P2 to form a signal dividing voltage circuit to be sent to a compare circuit and anther terminal P1 to transmit signals to said compare circuit:

Said compare circuit including an OP amplifier, which has a third pin receiving signal input from said terminal P2, and a second pin receiving signals from said first terminal: and,

Working current, working voltage and oscillating frequency of said oscillator immediately changing in case of no water left in a water tank of a supersonic humidifier, signal values of said terminal P2 and P1 then becoming different or changing excessively large so that said second and said third pin of said OP amplifier may have different input values, letting said first pin of said OP amplifier receive signal output to transmit to the subsequent circuit so as to stop operation of said drive circuit of said oscillator and protectively turn off said humidifier.

ABSTRACT OF THE DISCLOSURE

A protective circuit for a supersonic humidifier includes a compare circuit to obtain working voltage at two terminals of an ~~oscillator~~ ultrasonic vibrating member to decide whether the humidifier is to be continued to operate or stopped so as to protect it from burning up. The protective circuit does not utilize a vibration needle, a float, a magnetic switch and a HALL IC used in conventional humidifiers.